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(54) INVERTER DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an inverter device which is highly versatile on account of easy-to-modify control parameters and is highly reliable because of fewer troubles due to operation.

SOLUTION: This device comprises an inverter circuit 5 which is fed with direct-current power supply 2 and outputs alternating current by switching, and consists of a parameter storing means 8 which stores a plurality of parameters, an inverter controlling means 6 which controls the inverter circuit 5, and a communication controlling means 2 which exchanges information with an external control device 4. The parameter-storing means 8 selects parameter groups to be used for control from among the parameter groups to be stored according to a received identification value of the external control device 4, limits modification to the contents of parameters to required parameters, selects parameter groups stored in a parameter initial value storing means 9, and initializes the parameters.
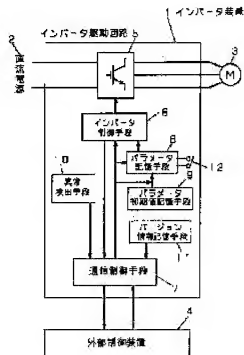
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the output functions of the controlling method of the control parameter of the inverter device which drives an electric motor on arbitrary frequency and its operation information, and management information.
[0002]
[Description of the Prior Art]Conventionally, especially in the inverter device which drives the electric motor of the compressor of an air conditioner, etc. on arbitrary frequency, what has a memory measure which remembers that two or more parameters become possible to change the operating characteristic in the inside of an inverter device is devised in the general-purpose inverter device. In the inverter device, it is possible to change the contents of the memory measure by communication from an external control device, and has the structure where the operating characteristic of an inverter device can be changed arbitrarily by that cause.
[0003]When abnormalities occur inside an inverter device, the device which tells a user only about the thing limited among the abnormality content by carrying out a LED display etc. is devised.
[0004]
[Problem(s) to be Solved by the Invention]However, in such an inverter device, since the parameter was memorized only for 1 set by memory storage, even when a model change, for example, the use element of an inverter, changed, a parameter could not be changed easily, but software all needed to be rewritten.
[0005]Although it is possible to rewrite the contents of the parameter from an external control device, Since change of all the parameters was uniformly enabled no matter it might operate it by what external device, When an external control device changes, from the external control device which the user of an inverter device uses, for example. Even when it changed to the

external control device which a device developer and a device maintainer use, the range of the parameter which can be operated was the same, it was hard to maintain it or the problem of being easy to cause an operation trouble had produced it.

[0006]Since the LED display etc. were performed as a method of telling abnormalities outside when abnormalities occurred in an inverter device, the kind of many abnormalities could not be classified, and it could not tell outside about, but the method only had carrying out the abnormality display of the limited abnormalities.

[0007]There was no method of the version information of an inverter device disassembling the device, and a method only having seeing and judging an inner substrate, and carrying out version information of the inverter device etc. by which the mold was carried out.

[0008]While this invention solves the above-mentioned conventional problem, and being able to change operation setting easily and providing a general-purpose inverter device with few operation troubles, also telling information promptly detailed also at the time of the abnormalities of an inverter, and the version information of a device outside -- the easy reliability of maintenance -- it aims at realizing high operation.

[0009]
[Means for Solving the Problem]In order to attain this purpose an inverter device of this invention, DC power supply are inputted and it has an inverter circuit which outputs exchange by switching, a parameter storage means which memorizes two or more parameters, and an inverter control means which controls an inverter circuit according to a parameter which said parameter storage means memorizes.

[0010]Said parameter storage means memorizes 1 set or two or more sets of parameter groups corresponding to two or more parameters required for control of an inverter circuit, and is provided with a function which chooses a parameter group used for control in said inverter control means from the parameter groups.

[0011]It has a selecting switch and has a function which chooses a parameter group used for control in said inverter control means from parameter groups which said parameter storage means memorizes according to setting out of a selecting switch.

[0012]According to information which was provided with a communication control means which performs an exchange of an external control device and information, and was received by said communication control means, It has a function which chooses a parameter group used for control in said inverter control means from parameter groups which said parameter storage means memorizes.

[0013]A communication control means which performs an exchange of an external control device and information is provided with a function to change the contents of the parameter which said parameter storage means memorizes with a requirement signal from an external control device.

[0014]It has a parameter initial value memory measure which memorizes 1 set or two or more sets of initial parameter groups corresponding to an initial value of two or more parameters, and has a function which initializes a parameter which said parameter storage means memorizes according to the contents of the arbitrary parameter group.

[0015]Initialization of a parameter which said parameter initial value memory measure memorizes, It has a function carried out by the initialization instructions from an external control device, and has a function which chooses as a parameter storage means a parameter group which carries out initialization setting out from initial parameter groups which said parameter initial value memory measure memorizes according to information further received by a communication control means.

[0016]An inverter circuit which inputs DC power supply and outputs exchange by switching, An inverter control means which controls an inverter circuit, a communication control means which performs an exchange of an external control device and information, and an abnormality content generated in an inverter device are detected, and it has a malfunction detection means with a function which transmits it to an external control device through said communication control means. When said malfunction detection means detects two or more abnormality contents, it is provided with a function which transmits preferentially an abnormality content defined beforehand from a high abnormality content of a priority according to a priority.

[0017]An inverter circuit which inputs DC power supply and outputs exchange by switching, Version information of an inverter control means which controls an inverter circuit, a communication control means which performs an exchange of an external control device and information, and an inverter device is memorized, and it has a version information memory measure with a function which transmits it to an external control device through said communication control means.

[0018]

[Embodiment of the Invention]The signal of the selecting switch of the device attachment by the parameter which uses an inverter device for control by this composition, or the signal from an external control device can perform change or initialization easily, and the flexibility of a device can be improved. The parameter which can be changed can be limited according to the kind of external control device, and, thereby, little improvement in reliability of the trouble by operation can be realized.

[0019]Even when an abnormality content is promptly transmitted to an external control device through a means of communication when abnormalities occur in an inverter device, and two or more abnormalities occur still more nearly simultaneous, in order to transmit preferentially from the abnormality content of which quick nature is required, it contributes to the improvement in reliability of a device.

[0020]Since it has a function which transmits the version information of an inverter device to an

external control device through a means of communication, easy maintenance of a device is realized.

[0021]

[Example]Hereafter, one example of the inverter device by this invention is described based on figures.

[0022]Drawing 1 is a block lineblock diagram of one example of the inverter device by this invention. By switching the input from DC power supply 2 in the inverter drive circuit 5, exchange is outputted and the external control device 4 carries out setting out of a frequency command, acquisition of an operation condition, etc. by communication to the inverter device 1 which drives the external electric motor 3 by that cause.

[0023]The switching element etc. are built in the inverter drive circuit 5 in the inverter device 1. The switching performs conversion to the exchange from a dc input.

The communication control means 7 carries out communication between the external control devices 4, outputs the information acquired by communication, for example, information, including command frequency etc., to the inverter control means 6, or outputs the information inside an inverter, for example, information, including the present output frequency etc., to the external control device 4. The inverter control means 6 determines a switching pattern of a SUITCHIGGU element in which the frequency of the exchange which the inverter device 1 outputs turns into command frequency based on the information on the command frequency which the communication control means 7 outputted, and outputs it to the inverter drive circuit 5.

[0024]The inverter control means 6 is faced determining a switching pattern, and acquires parameters, such as a required voltage-frequency characteristic and frequency acceleration speed, from the parameter storage means 8. Two or more parameter groups which become this parameter storage means 8 from two or more parameters used for control are memorized. It is determined by the input from the switch 12 installed in the inverter device 1 which parameter group of them is chosen.

On the other hand. The value of the parameter memorized by this parameter storage means 8 can be changed via the communication control means 7 with the signal from the external control device 4. It can also initialize using the value of the parameter initial value memory measure 9 which memorizes the initial value.

[0025]The malfunction detection means 10 detects information, including the abnormality content generated inside the inverter device, for example, an over-current, a undervoltage, etc., and transmits the contents to the external control device 4 through the communication control means 7. The external control device 4 processes lowering command frequency etc. based on the unusual warning information. This malfunction detection means 10 is outputted to the communication control means 7 sequentially from a high warning of a priority based on the

priority defined beforehand, when two or more warning is detected simultaneously.

[0026]The version information memory measure 11 memorizes the version information of the inverter device 1, and transmits the contents to the external control device 4 through the communication control means 7. Without disassembling the inverter device 1 and checking a substrate by this, the version of the inverter device 1 can be easily checked from the exterior, and a prompt maintenance action is realized.

[0027]

[Table 1]

Ｎｏ．	パラメータ内容
1	設定周波数
2	加速時間
3	減速時間
4	上限周波数
	$\wr\wr$
30	モジュール温度トリップレベル
31	チョッピング方式
32	電流検出補正

[0028]Table 1 is an example of the parameter which the parameter storage means 8 in the inverter device by this invention memorizes. The inverter control means 6 controls an inverter using the value of such two or more parameters.

[0029]Drawing 2 is an example figure of a flow where the parameter group actually used for control among two or more sets of parameter groups which the parameter storage means 8 in the inverter device by this invention memorizes is chosen. Thus, it is judged by the input from the selecting switch 12, and a parameter group is determined. Here, although the parameter group was chosen by the input from the selecting switch 12, it cannot be overemphasized that it can choose with the identification value of the external control device 4 transmitted from the external control device 4.

[0030]

[Table 2]

No.	パラメータ内容
1	設定周波数
2	加速時間
3	減速時間
4	上限周波数
⋮	
14	基底周波数
15	トルクブースト
⋮	
31	チョッピング方式
32	電流検出補正

#1レベルパラメータ（1〜4）　#2レベルパラメータ（1〜15）　#3レベルパラメータ（1〜32）

[0031]Table 2 is a table showing an example of the range which can be changed with the external control device 4 among two or more parameters which the parameter storage means 8 in the inverter device by this invention memorizes. In this case, the parameter of #1 level is from parameter No.1 to No.4, the parameter of #2 level is from parameter No.1 to No.15, and it is determined that the parameter of #3 level is from parameter No.1 to No.32. On the other hand, if the identification value of the external control device 4 received by the communication control means 7 is level 1, it will not be allowed to change this external control device 4 only from parameter No.1 to No.4. If an identification value is the level 2, it will be allowed to change this external control device 4 from parameter No.1 to No.15. If an identification value is the level 3, it will be allowed to change this external control device 4 from parameter No.1 to No.32. Thus, by limiting the parameter range which can be changed according to the identification value which the external control device 4 has, If an external control device is a general user's device, only a minimum parameter will allow change, and if it is a maintainer's device, all the parameters can be maintained, and thereby, management of a reliable efficient inverter device is attained.

[0032]Drawing 3 is an example figure of a flow where the group set as the parameter storage means 8 by initialization among two or more sets of parameter groups which the parameter initial value memory measure 9 in the inverter device by this invention memorizes is chosen.

Thus, the parameter group initialized by the input from the selecting switch 12 is chosen. It is possible to change by this, the parameter which is only setting out of the selecting switch 12 and is initialized, even when a parameter needs to be changed by specification change of an inverter device.

[0033]

[Table 3]

#1 初期化レベルパラメータ	No.	パラメータ内容	#2 初期化レベルパラメータ	#3 初期化レベルパラメータ
	1	設定周波数		
	2	加速時間		
	3	減速時間		
	4	上限周波数		
	⋮	⋮		
	14	基底周波数		
	15	トルクブースト		
	16	一致検出幅		
	⋮	⋮		
	30	モジュール濃度トリップレベル		
	31	チョッピング方式		
	32	電流検出補正		

[0034]In the parameter initial value parameter group chosen so that it might be set as the parameter storage means 8 by initialization in the parameter initial value memory measure 9 in the inverter device by this invention, Table 3, It is a table showing an example of the range of the parameter set as the parameter storage means 8 by initialization. In this case, the parameter of #1 initialization level is from parameter No.1 to No.3, the parameter of #2 initialization level is from parameter No.1 to No.16, and the parameter of #3 initialization level is from parameter No.1 to No.32. On the other hand, if the identification value of the external control device 4 received by the communication control means 7 is level 1, it will not be allowed to initialize this external control device 4 only from parameter No.1 to No.3. If an

identification value is the level 2, it will be allowed to initialize this external control device 4 from parameter No.1 to No.16. If an identification value is the level 3, it will be allowed to initialize this external control device 4 from parameter No.1 to No.32. Thus, by limiting the parameter range which can be initialized according to the identification value which the external control device 4 has, If an external control device is a general user's device, only a minimum parameter will allow initialization, and if it is a maintainer's device, all the parameters can be initialized, and thereby, management of a reliable efficient inverter device is attained.

[0035]Next, the working principle of the malfunction detection means 10 in the inverter control device by this invention is explained. When the overload by the abnormalities of the abnormalities in an inverter device, for example, shortage of input voltage, module overheating, and communication and an over-current, etc. occur, the malfunction detection means 10 detects it and transmits the information to the external control device 4 through the communication control means 7.

[0036]

[Table 4]

優先レベル	警告内容
7	通信異常
6	不足電圧
6	過負荷
〳	〳〳
1	加速ストール
0	モジュール過熱

[0037]Table 4 shows an example of the priority level of an abnormality content. When two or more abnormalities occur, the malfunction detection means 10 performs which abnormality information is preferentially transmitted to the external control device 4 through the communication control means 7 according to the priority level shown in this table. For example, when two or more abnormality contents are the abnormalities in communication, and module overheating, since the priority level of 7 and module overheating is 0, the priority level of the abnormalities in communication outputs preferentially the information on the high abnormalities in communication of priority level to the external control device 4. When this

transmits preferentially from the abnormalities which require urgency, the anomalouscorrespondence with quick high reliability becomes possible.

[0038]Drawing 4 is a figure showing the working principle of the version information memory measure 11 in the inverter control device by this invention. The version information memory measure 11 memorizes the information on the version change by the microcomputer software of an inverter device, and specification change of hardware. When there is an inquiry through the communication control means 7 from the external control device 4 about this version information, it answers through the communication control means 7. Thereby, from the appearance of the inverter device 1, since the specification information which cannot be judged can also be judged from the external control device 4 by communication, effective maintenance correspondence is realizable.

[0039]The inverter control means 6 and the communication control means 7 of this invention are not cared about even if the software which used the microcomputer even if it realized in the hard circuit for exclusive use realizes.

[0040]

[Effect of the Invention]In the inverter device by this invention, as mentioned above. The inverter circuit which inputs DC power supply and outputs exchange by switching, It has a parameter storage means which memorizes two or more parameters, and an inverter control means which controls an inverter circuit according to the parameter which said parameter storage means memorizes, Said parameter storage means memorizes 1 set or two or more sets of parameter groups corresponding to two or more parameters required for control of an inverter circuit, The signal of the switch of the device attachment by the parameter group used for control in said inverter control means out of the parameter group, Or a selection change of the parameter group set as a parameter storage means out of the memory content of the parameter initial value memory measure which could change easily with the signal from an external control device, and memorized two or more initial parameter groups can be made easily, and the general-purpose student of a device can be raised. The parameter which can be changed can be limited according to the kind of external control device, and, thereby, little improvement in reliability of the trouble by operation can be realized.

[0041]Even when an abnormality content is promptly transmitted to an external control device through a means of communication when abnormalities occur in an inverter device, and two or more abnormalities occur still more nearly simultaneous, in order to transmit preferentially from the abnormality content of which quick nature is required, it contributes to the improvement in reliability of a device.

[0042]Since it has a function which transmits the version information of an inverter device to an external control device through a means of communication, easy maintenance of a device is realized.

[Translation done.]

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CLAIMS

[Claim(s)]
[Claim 1]An inverter circuit which inputs DC power supply and outputs exchange by switching,
In an inverter device which comprises a parameter storage means which memorizes two or
more parameters, and an inverter control means which controls an inverter circuit according to
a parameter which said parameter storage means memorizes, Said parameter storage means
memorizes 1 set or two or more sets of parameter groups corresponding to two or more
parameters required for control of an inverter circuit, An inverter device having a function which
chooses a parameter group used for control in said inverter control means from the parameter
groups.
[Claim 2]The inverter device comprising according to claim 1:
One or two or more selecting switches.
A function in which said parameter storage means chooses a parameter group used for control
in said inverter control means according to setting out of said selecting switch from parameter
groups.

[Claim 3]The inverter device comprising according to claim 1:
A communication control means which performs an exchange of an external control device
and information.
A function which chooses a parameter group used for control in said inverter control means
from parameter groups which said parameter storage means memorizes according to received
information by said communication control means.

[Claim 4]An inverter device, wherein information received by said communication control
means according to claim 3 is an identification value of an external control device.
[Claim 5]The inverter device comprising according to claim 1:

A communication control means which performs an exchange of an external control device and information.

A function in which said communication control means changes the contents of the parameter which said parameter storage means memorizes with a requirement signal from an external control device.

[Claim 6]An inverter device, wherein a communication control means in said inverter device according to claim 5 has a function which limits change of the contents of the parameter which said parameter storage means memorizes to a predetermined parameter according to received information.

[Claim 7]An inverter device, wherein information received by said communication control means according to claim 6 is an identification value of an external control device.

[Claim 8]The inverter device comprising according to claim 1:

A parameter initial value memory measure a comb remembers two or more sets of initial parameter groups to be as for 1 set corresponding to an initial value of two or more parameters which said parameter storage means memorizes.

A function which initializes a parameter which said parameter storage means memorizes according to the contents of the arbitrary parameter group.

[Claim 9]The inverter device comprising according to claim 8:

One or two or more selecting switches.

A function in which said parameter initial value memory measure carries out a parameter group which carries out initialization setting out according to setting out of said selecting switch to said parameter storage means out of an initial parameter group.

[Claim 10]The inverter device according to claim 8 provided with a function which initializes a parameter which said parameter storage means memorizes by the initialization instructions from an external control device.

[Claim 11]The inverter device according to claim 10 having a function which chooses as a parameter storage means a parameter group which carries out initialization setting out from initial parameter groups which said parameter initial value memory measure memorizes according to information received by said communication control means.

[Claim 12]According to information received by said communication control means, out of a selected initial parameter group which said parameter initial value memory measure memorizes. The inverter device according to claim 11 having a function which limits a parameter which carries out initialization setting out to a predetermined parameter in a parameter storage means.

[Claim 13]An inverter device, wherein information received by said communication control means according to claim 12 is an identification value of an external control device.

[Claim 14]An inverter circuit which inputs DC power supply and outputs exchange by switching, An inverter control means which controls an inverter circuit, a communication control means which performs an exchange of an external control device and information, An inverter device comprising a malfunction detection means with a function which detects an abnormality content generated in an inverter device, and transmits it to an external control device through said communication control means.

[Claim 15]The inverter device according to claim 14 having a function which transmits preferentially from a high abnormality content of a priority according to a priority of an abnormality content defined beforehand when said malfunction detection means detects two or more abnormality contents.

[Claim 16]An inverter circuit which inputs DC power supply and outputs exchange by switching, An inverter control means which controls an inverter circuit, a communication control means which performs an exchange of an external control device and information, An inverter device comprising a version information memory measure with a function which memorizes version information of an inverter device and transmits it to an external control device through said communication control means.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The block lineblock diagram of one example of the inverter device by this invention
[Drawing 2]The explanatory view showing an example of the flow as which the parameter group actually used for control among two or more sets of parameter groups which the parameter storage means in the inverter device by this invention memorizes is chosen
[Drawing 3]The explanatory view showing an example of the flow as which the group set as a parameter storage means by initialization among two or more sets of parameter groups which the parameter initial value memory measure in the inverter device by this invention memorizes is chosen
[Drawing 4]The explanatory view showing the working principle of the version information memory measure in the inverter control device by this invention
[Description of Notations]
1 Inverter device
2 DC power supply
3 Electric motor
4 External control device
5 Inverter drive circuit
6 Inverter control means
7 Communication control means
8 Parameter storage means
9 Parameter initial value memory measure
10 Malfunction detection means
11 Version information memory measure
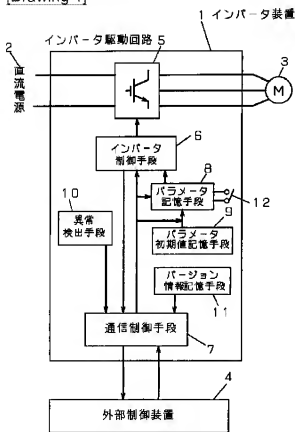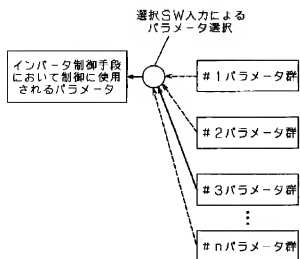12 Selecting switch

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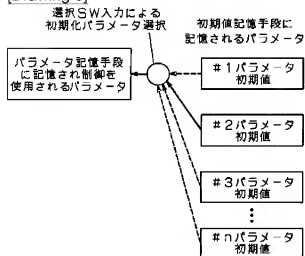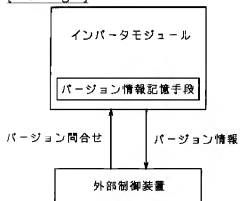

DRAWINGS

[Drawing 1]

[Drawing 2]

選択ＳＷ入力による
パラメータ選択

インバータ制御手段において制御に使用されるパラメータ

＃１パラメータ群

＃２パラメータ群

＃３パラメータ群
⋮

＃ｎパラメータ群

[Drawing 3]

選択ＳＷ入力による
初期化パラメータ選択

初期値記憶手段に
記憶されるパラメータ

パラメータ記憶手段に記憶され制御を使用されるパラメータ

＃１パラメータ
初期値

＃２パラメータ
初期値

＃３パラメータ
初期値
⋮

＃ｎパラメータ
初期値

[Drawing 4]

インバータモジュール
バージョン情報記憶手段

バージョン問合せ　　　バージョン情報

外部制御装置

[Translation done.]